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UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports\*  
for

SOIL CONSERVATION SERVICE RESEARCH\*\*

JANUARY 1947

EROSION CONTROL PRACTICES DIVISION

Reclamation of Gullied Areas with Profit - Dwight D. Smith, Columbia, Missouri.-"A quick method of reclamation used on a severely gullied area produced a gross return of \$51.00 worth of beef per acre the first year after treatment. This was the result of using heavy fertility treatments and adequate supporting conservation practices. The return paid the annual cost of the fertility treatment and farming, the total cost of smoothing gullies and terracing, and left a return of \$14.00 per acre on the original investment in land and cattle. Production closely approached that of grazing systems on areas with a normal depth of surface soil, but at materially higher mechanical and fertility treatment costs."

Benefits from Contouring - Terracing and Uphill Flowing - "Contour planting has resulted in average yield increases of 12% for soybeans and oats and 11% for corn. The larger yield increases have been on the steeper and longer slopes of the more permeable soils, and the lower yield increases or occasional yield decreases have occurred on the flatter and less permeable soils."

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\*\*All Research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

Reminder from the Summary Review Editor:

As a result of the original memo calling for monthly reports, some Project Supervisors tend to confine their reports to routine accounts of work schedules and prevailing weather conditions as these were items called for by this memo. We have long since abandoned the itemized report form in favor of a brief report of current happenings on the station. What we want is trends and results of your research findings which are of current interest to your fellow workers throughout the country. GIVE!

Crop Residues from Erosion-Resistant Crops Can be Made to be Very Effective in Reducing Soil and Water Loss.— H. O. Hill, Temple, Texas.—"These residues left on or in the surface layer of soil present their maximum resistance to erosion. During November, December, and January, clover residue is almost as effective as the growing plant in reducing erosion. The conventional spring bedding in preparing the land for a row crop reduces the effect of the residue and hastens its rotting process. The following table gives a comparison of crop residues and growing plants in resisting erosion.

Crop residue and crop covers compared in their effect on soil and water loss. November and December 1946 on 4% Austin clay soil.  
(72.5' plots)

Crop Residue or Cover	Rainfall Inches	Runoff of Rainfall	Soil loss per Acre
		%	Tons
Cotton residue (stalks standing)	8.86	1.95	0.09
Corn residue (stalks plowed under)	8.86	35.62	3.93
Oat residue (oat stubble plowed)	8.86	4.12	0.42
Hubam residue (threshed & plowed)	8.86	0.27	0.06
Oats planted in cotton stalks	8.86	1.96	0.04
Oats-hubam planted in cotton stalks	8.86	0.15	0.01
Hubam planted on prepared seed bed	8.86	2.51	0.11

"The small amount of soil and water loss from standing cotton stalks in this series of plots is unexplainable. On an adjacent 168 foot plot on 3-1/2 per cent Austin clay soil, standing cotton stalks lost .52 tons of soil per acre and 11.46 percent of rainfall as runoff. From these data, it would appear that the soil conditions under standing cotton stalks is considerably more resistant to erosion than freshly plowed land. Hence, unless resistant cover is present, the practice of late winter preparation of land results in lower erosion losses than does early plowing."

Runoff and Soil Loss - Row Grade and Length Experiment 1945-46.-  
Thomas L. Copley, Raleigh, North Carolina.-

Grade	121. ft. plots		181.5 ft. plots		Average Short & Long Plots	
	Run- off %	Soil- Loss T/ac.	Run- off %	Soil Loss T/ac.	Runoff Percent	Soil Loss Tons/Acre
12"	13.95	4.31	13.35	3.84	13.65	4.08
18"	15.71	5.44	15.91	5.73	15.81	5.58
24"	16.71	7.85	16.13	7.62	16.42	7.74

"These results show some increase in runoff with the increase in row grade-an effect which did not show up either in the original experiment or in other row studies. There is a consistent increase in soil losses as the row grade increases, and the two-year average of duplicate plots tend to smooth out irregularity between plots.

"In the original experiment there was a consistent tendency for the soil loss from the 18" grade to be greater than that from 12". In the revised experiment this was true in one series, but the opposite was true in the other series, indicating the possibility of soil variation. Both the runoff and soil loss was approximately the same on both the 121 foot plots and the 181.5 foot plots."

Runoff and Erosion Losses in Relation to Cropping Practices on Class II, III and IV Land - B. H. Hendrickson, Watkinsville, Georgia,- "It rained almost continuously during the January 7-20 period, totaling 7.00 to 7.45 inches on the station gages. Toward the end of this period, a flood rain on January 19 and 20 amounting to over 4 inches caused considerable runoff from some plots, little on others. Selected records of runoff for this rain period are given in the following table.

LAND CLASSES, SOILS, SLOPES, CROPS AND COVERS	RUNOFF		EROSION tons/acre
	inches	percent	
Land Class II Cecil sandy loam 3% slope.			
Continuous peanut land, bare	2.68	36.6	.41
Peanuts in 2-year rotation with oats- vetch and crotalaria	.35	4.8	.00
Dead cotton stalks standing after 7-years of continuous cotton	2.27	31.0	.21
Cotton- vetch, corn-crotalaria 2-year rotation average	.26	3.5	.00
Land Class III Cecil sandy clay loam 7% slope.			
Dead cotton stalks standing after 2 years continuous cotton following 3 prior years of continuous peanuts	3.24	43.5	1.24
Dead cotton stalks standing after 7 contin- uous years of cotton	2.41	32.4	.49
Cotton-vetch, corn-crotalaria, 2-year average	2.16	28.9	.19
Oats-sown lespedeza, volunteer lespedeza and cotton - 3-year rotation average	.31	4.2	.00



Land Class IV Cecil clay subsoil - 11% slope.

Dead cotton stalks after 7 ears of continuous cotton	3.32	46.7	1.08
Thin stand of sericea, hay stubble mulch	2.85	39.6	.00
Oats-sown lespedeza, volunteer lespedeza, corn - 3-year rotation average	1.11	15.5	.51
Kudzu - corn, 3-year rotation average	1.26	17.8	.21
Good stand of sericea, hay stubble mulch	.76	10.6	.00

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"Continuous cotton on 3, 7 and 11-percent slopes lost 31.0, 32.4 and 46.7 percent of the rainfall in the form of surface runoff respectively. Both 3 and 7 percent slope plots either in continuous peanuts or now in cotton but still out of condition due to hold-over effects of prior continuous peanut cropping, lost the highest amounts of runoff.

"Sharply reduced runoff occurred with all rotations under test. The 2-year rotation of oats-vetch-crotalaria, and peanuts practically stopped runoff on Class II land. A 2-year rotation of cotton-vetch, corn-crotalaria also virtually stopped runoff on Class II land, but only reduced it slightly on Class III land where it is distinctly out of place.

"The 3-year corn rotation based on 2 years of lespedeza practically stopped runoff on Class III land, and on Class IV land reduced it to 1/3 the amount lost by continuous cotton.

"Winter runoff was characteristically highest on the eroded steep slopes. Well established stands of kudzu and sericea permitted the least runoff and virtually stopped all erosion from this flood rain.

"All streams in North Georgia were in flood stage as a result of this heavy rain. It appears from our results that there would have been only a slight steady rise in stream flow if all croplands on farms were handled in suitable rotations, and if steeper slopes were in established stands of the perennial legumes, in pasture sods, or in woodlands."

Most of the Erosion on Corn Land Occurred in June at Urbana, Ill.-  
C. A. Van Doren, Urbana, Illinois.-"The yearly analysis of soil losses on the contour farming plots at Urbana emphasized very strongly the necessity for protection through conservation practices of land to be placed in cultivated crops. The following table shows the average soil losses in June, losses during the four month period April through July, and the average yearly losses during production of corn on a two per cent slope.

Erosion Hazard from Corn, South Farm (1941-46)		
Period	Soil Losses	
	Contoured	Non-Contoured
June	1.8 T/A	2.3 T/A
4 months (April-July)	2.2 T/A	3.4 T/A
Yearly Average	2.2 T/A	3.6 T/A

"The losses in June were 63 percent of the total yearly losses on the contoured plot and 77 percent of the total yearly losses on the non-contoured plot. The importance of individual storms in causing erosion damages is further emphasized by the fact that in 1946 one rain of 2.24 inches caused 83 to 90 percent of the yearly soil losses from the corn plots."

Soil Losses in Corn-Winter Wheat-Lespedeza Rotations on Different Slopes - C. A. Van Doren, Dixon Springs, Illinois.-"The average annual soil losses from duplicated plots in winter wheat at Dixon Springs were slightly reduced by inclusion of the third crop of winter wheat which was produced 1945-1946. Losses from winter grain under the system of management at Dixon Springs have exceeded the losses from a cultivated crop of corn on 5 percent slopes and have been only slightly under losses from corn on 9 percent slopes. These plots were originally established on the grazing management system whereby corn stalks were removed prior to preparation of the land for winter wheat, while winter wheat was completely harvested by grazing in April. The livestock system of utilization of corn as silage and the complete removal of winter wheat in the spring by grazing has proved to be a hazardous system to follow. Soil losses from the three year rotation corn, winter wheat (lespedeza), lespedeza are shown below for both 5 and 9 percent slopes, from plot lengths varying from 35 to 210 feet:

Crop	35'	70'	140'	210'
<u>Average Soil Losses - Tons Per Acre</u>				
	<u>5% Slope</u>			
Corn (5 months)	4.0	5.6	6.6	4.8
Winter Wheat (7 months)	5.6	9.7	13.5	10.7
Lespedeza (24 months)	4.9	5.8	5.8	4.0
Average per year	4.8	7.0	8.6	6.3
	<u>9% Slope</u>			
Corn (5 months)	9.8	13.3	15.7	17.8
Winter Wheat (7 months)	7.3	10.3	14.1	14.6
Lespedeza (24 months)	5.3	6.1	6.5	5.8
Average per year	7.5	10.0	12.1	12.7

Runoff, Soil Loss, and Yield and Value of Tobacco Organic Matter  
Cover Crop Experiment - T. L. Copley, Raleigh, North Carolina.-

Cover Crop or Rotation	Runoff 1944-46	Soil Loss 1944-46	Yield 1942-46	Value 1942-46	Variation from Check Plots	
					Soil Loss	Value of Tobacco
	percent	tons/ac	lbs/ac	dol/ac	percent	percent
No winter cover	12.36	4.80	1007	\$458	100.	100.
Rye	13.42	4.26	1027	461	88.8	100.7
Rye, nitrated	10.95	4.16	1130	500	86.7	109.2
Rye grass	12.75	4.48	1088	493	93.3	107.6
Rye grass, nitrated	10.86	2.42	1005	463	50.4	101.1
Tobacco after weeds	10.44	4.78	1143	517	99.6	112.9
Weeds	4.97	.43	-	-	-	-
Tobacco after red top	14.53	5.06	1101	477	105.4	104.1
Red top	11.49	.36	-	-	-	-

"This experiment shows that cover crops and other residues turned into soil cannot be depended on to effectively reduce soil losses during the summer period on the sandier types of tobacco soil. That this is so, may be due to two things: (1) In sandy soils, with temperatures common to this area, organic matter quickly decomposes and has almost disappeared before the June, July and August rains, (2) The method used in cultivating tobacco which results in the developing of high row ridges apparently encourages rapid runoff and prevents the incorporated material from being as effective as it might otherwise be.

"The ineffectiveness of the incorporated residue apparently places the burden of soil conservation during the summer time on contour tillage and proper row layout which were constant factors in this study."

Good Agronomy Vs. Poor Agronomy - Mulch on Wheat Reduces Soil Loss -  
H. W. Black, Zanesville, Ohio.-"Comparative soil losses from 6 ft. by 72 ft. rotation plots - 12% slope Muskingum soil, 3 year average 1944 to 1946 inclusive:

Soil Loss - Tons Per Acre Per Year

	Corn	Wheat	Meadow-1	Meadow-2	Rotation Av.
Poor agronomy <u>1/</u>	35.00	14.49	1.83	.135	12.86
Good agronomy <u>2/</u>	33.80	1.102	.19	.168	8.81

1/ Limited amount of limestone; no fertilizers, 4 ton manure on corn.

2/ Liberal amounts of limestone; fertilizers, 5 ton manure on corn and 4 tons manure top dressing on wheat.



"The most evident reduction in soil loss has been the result of top dressing wheat with manure. The need for top dressing or some practical system of mulch culture for the corn crop is evident. These plots are 72 feet slope length, are contour planted and represent a section taken from a contour strip cropped field. The soil losses are indicative of down hill movement of soil."

Production and Utilization of Legume-grass Forage Crops with Beef Cattle on Hill Land - "Approximately two acres of worn out, hill land, seeded to legume-grass mixtures and .25 acre of rotation cropland produced feed for 412 pound gain on 641 pound steers in 355 days. The steers were purchased in the fall of 1945, fall pastured for 55 days, winter fed on legume-grass hay for 153 days, spring pastured for 68 days and summer pastured plus 8 bushels of corn and cob meal for 79 days.

"The steers sold in the good slaughter class even with this limited grain ration. The gross income per acre was \$48.42.

"This tentative balance of 2 acres pasture to .25 acre cropland (which can be still further improved upon) indicates the possibilities of a substantial reduction in the grain acreage and increased production and utilization of forage crops in a constructive conservation program."

Dust Storm - C. J. Whitfield, Amarillo, Texas. - "One of the severest dust storms in many years occurred on January 29. A 56-m.p.h. wind with occasional gusts up to 70-m.p.h. struck the Panhandle Plains area about noon and continued for about six hours. The storm, apparently, originated in New Mexico as much of the material carried by the wind was reddish in color. In the vicinity of the Amarillo station, no considerable amounts of soil movement occurred. However, sufficient drifting took place to serve as a warning as to what might happen in the future if the dry, windy conditions continue. Conditions under which the heaviest wind erosion occurred are as follows:

1. Draws in wheat fields. Such areas should have been left in grass or need to be returned to grass.
2. One to three per cent slopes that had been cultivated and planted to wheat. One of the most important problems in the High Plains is the control of erosion on Class III lands. These areas need to be returned to grass.
3. Fields planted to wheat early and heavily grazed.
4. Sorghum fields with rows running parallel with the wind.
5. Roads.

Cover Crops for Wind Erosion Control - The yield data for plots continuously cropped to wheat on Pullman silty clay loam soil were summarized during the month. These plots have been in continuous wheat since 1940 in this experiment. Tillage has been timely in all instances and with tillage implements commonly used by farmers of the area. Wind erosion has not occurred on these plots during the 6-year period and no emergency tillage to prevent soil blowing has been necessary. Yields, soil moisture, and rainfall data are given in the following table:

Wheat Yields - Land in Continuous Wheat					
Year of Harvest	Rainfall July to Nov. Preparation Period (Inches)	Soil Moisture Depth at Seeding Time* Previous Year (Inches)	Rainfall Nov. thru June Growth Period (Inches)	Annual Rainfall July thru June (Inches)	Grain Yield Bu/Acre
1941	1.92	0	16.43	18.35	25.36
1942	18.89	78	7.64	26.53	19.99
1943	10.14	24	7.16	17.30	6.82
1944	7.79	13	13.42	21.21	25.00
1945	9.61	33	6.05	15.66	4.40
1946	9.12	24	4.38	13.50	5.20
Average	9.57	28.6	9.18	18.75	14.46
8-yr. Precipitation Average	9.20		9.15	18.35	

\* Seeding time usually October 1-15

"Grain yields have been above average three years out of six and rainfall average or above, three of the six years. While moisture stored in the soil at seeding time is important, indications are that high yields cannot be expected without average or above spring rainfall with good distribution. The high yield of 25.36 in 1941 was made altogether on moisture falling after the wheat was planted and the 1946 yield was made mainly on moisture stored before or shortly after the wheat was seeded. The importance of distribution is shown in the 1941 and 1943 yields when there was not a wide difference in amount of moisture and a wide difference in yields. Part of this difference was due to insect damage but rainfall distribution was the important factor. Chemical analysis of the soil is being made on land in continuous wheat, sorghum, and grass and will be included in subsequent reports.

Grazing Studies - "The winter grazing experiment consists of a comparison of wheat forage steers and 'grass and cake' steers. In the 1945 and the 1946 trials, 'wheat calves' consistently outgained the 'grass and cake' ones. Wheat calves are given access to standing dry feed or are fed bundles. The wheat calves have not been weighed since the start of the comparison on December 1, 1946 but they are in good condition and gaining.

"The 'grass and cake' steers on native blue grama-buffalo grass, with some reseeded western wheatgrass, gained an average of 1.5 pound daily, going from an average weight of 448.5 on January 1 to 496.5 on February 1, 1947. Their weight has increased as follows: 395.5, December 1, 1946; 448.5, January 1, 1947; 496.5, February 1, 1947. They each receive two pounds of cake per day.

"Wheat steers were removed from the test wheat on J-2 on January 3 and placed on a reseeded pasture, I-5, which they grazed closely. On January 16, they were moved to I-2(W), a reseeded western wheat, blue grama pasture. On January 27, they were moved back to wheat on Field J-2."

News Items On Grazing Studies - R. E. Dickson, Spur, Texas.-"Results at the end of a 5-year summer grazing study show that reducing the number of steers 1/3 on 6 native pastures has increased acre gains 11 per cent and steer gains 60 pounds per head. The pastures stocked 1/3 lighter (one steer to 4.89 acres, for a 145 day period) show an average utilization of 52 percent of total forage as compared to 82 percent for 6 pastures stocked at the rate of one steer to 3.28 acres.

"Livestock studies at Spur station show that 24 yearling steers on good winter wheat pasture supplemented in some cases with sorghum roughages have made an average daily gain of 2.18 pounds or 183 pounds gain per steer in an 84 day period. The cost of gain per cwt. was \$5.26. On the other hand 80 head of yearling steers in the feed lots fed rations of silages, cottonseed hulls, grain and cottonseed meal made an average daily gain of 2.26 pounds or a steer gain of 126 pounds per head. The cost of gain per cwt. for feed lot steers was \$18.29 or \$13.02 more than steers on winter wheat pasture. Wheat pastures were charged at \$3.00 per head per month.

"Steer calves on winter wheat supplemented with uncut early sumac, sweet sudan, martin milo stubble and no sorghum roughage made average daily gains of 2.05, 1.79, 2.03 and 2.03 pounds over an 84 day period."

Wheat Yield and Soil Moisture Improved by Contouring - Torlief S. Aasheim, Bozeman, Montana.-"A summary of the data from the contour study at Havre, Montana for 1946, shows more moisture per foot of soil in the contoured plots than in the plots cultivated up and down the slope. Yields were also higher on plots cultivated on the contour.

	% Moisture Per Foot Spring 1946	% Moisture Per Foot Fall 1946	Bu. Wheat Per Acre 1946
Fallow cultivated on contour	10.9	9.6	15.8
Fallow cultivated up and down slope	10.3	9.1	13.4



Wind Erosion - H. H. Finnell, Amarillo, Texas.-"The late winter and early spring windy season started just about on time this year. A severe blow from the west on January 29 whipped up a general dust storm covering portions of eastern New Mexico and most of northwest Texas. Duration in Amarillo was 7 hours and 50 minutes, with visibility varying from one-eighth to one-fourth mile. Local blowing during the storm was particularly severe in the area of Tulia and Kress. Between Amarillo and Plainview considerable wreckage of highway traffic occurred. Some overgrazed wheat fields were blown out. Also, some land was damaged where adequate care to obtain and preserve protective ground cover had been neglected.

A wire report prepared and sent to the Fort Worth office, with copies to Albuquerque, Lincoln and Washington follows:

"If farmers and public continue to make light of danger signals as they did last year the general dust over northwest Texas yesterday is only a mild sample of that to come. The one important fact most persistently ignored is that the dust blowing of 1947 could only be avoided by adequate precautionary measures taken in 1946. The most hazardous areas are thin soil and deep sand parts of western Texas and eastern New Mexico where rainfall averages less than seventeen inches annually. This was increased by expansion acreage of war crops. But serious blowing extended much eastward where heavy grazing has exposed wheat fields and sorghum stubble fields. This present hazard will continue through 1947 spring windy season. Whether will continue into 1948 depends on what farmers do in 1947 to get erosion resistant crops on exposed land and let the trashy residues stay there."

Permeability Decreased by Laboratory Storage of Cavode Subsoil - Richard M. Smith, Morgantown, West Virginia.-"Percolation tests on Cavode subsoil from a timbered area show that storage and aging have decreased the permeability compared to that of the freshly-sampled soil, although the samples were kept in a moist condition and fungus growths were prevented with toluene.

"It appears that with this highly-colloidal subsoil the gel-like clay has run together and congealed enough to block off many formerly-active pore spaces. This behavior and the decrease from about 0.1 inch per hour when fresh to about 0.01 inch per hour after aging is consistent with our understanding of the behavior of Cavode subsoil. We had not realized the marked influence which would result from laboratory aging, but from the nature of the material and the localized extent of the pores permitting water movement we believed that the percolation rate of 0.1 inch per hour would likely change to much lower values in the field if the native timber cover was disturbed or if the land was used as pasture.

"In contrast to this, the Hagerstown subsoil which has been checked repeatedly shows little or no influence from aging. The percolation is accounted for by numerous connected pores among the naturally distinct aggregates.



Average Yield and Quality of Weeping Lovegrass Hay Cut at Different Stages of Growth - Harley A. Daniel, Guthrie, Oklahoma.-

Periods of Growth When Mowed	Pounds of Hay per acre <sup>1/</sup>	
	Average 1944-46	Grade
Prior to producing seeds and stems <sup>2/</sup>	2852	Extra green and leafy
When about <sup>2/3</sup> of seed stems had appeared <sup>2/</sup>	3378	Green and stemmy
After seed had matured <sup>3/</sup>	3704	Green, extra stemmy and fibrous

- <sup>1/</sup> The average yield of native grass hay on virgin land at Guthrie is about 2,000 pounds per acre.  
<sup>2/</sup> Mowed three to four times each year.  
<sup>3/</sup> Mowed two to three times each year. Average seed yield for three years, 50 pounds per acre.

"Weeping lovegrass produced the largest amount of hay after it produced seed. In this mature condition, however, it was very stemmy and fibrous and of poor quality. But when it was out in an immature condition, the hay was extra green and leafy and of good quality. Therefore, it appears that by frequent mowing and careful managing, weeping lovegrass may be made to produce good hay."

Equipment for Stubble Mulch Practices - G. M. Horner, Pullman, Washington.-"A meeting December 7 in Colfax was attended by farmers of the Central Whitman SCD, implement dealers, and SCS operations and research personnel. Most of these farmers had cooperated with the Service in conducting stubble mulch field trials last summer. The group discussed the performance of each tillage implement used in the summer fallow operations, with the objective of pointing out the advantages and difficulties associated with each. The principal points are as follows:

1. The greatest difficulty was encountered during the first rod-weeding operation. Some of the weeders used had inadequate clearance, but even the best models available did not operate satisfactorily in all cases. In some fields, the rodweeder would not penetrate, or would go too deep. The trouble was apparently caused by the firm condition of the tilled layer of soil. A shovel attachment to the rod helped in some cases, but was not entirely satisfactory.

2. It was suggested that some modification of the sweep tiller would help to facilitate the first rodweeding. The sweep shovels should be modified and/or provided with attachments so that the soil would be loosened to a greater extent at the time of the initial tillage.
3. The sweep tiller should be modified in order to operate satisfactorily on steep slopes. The machine tended to slide down-slope, and the shovels on the upper side operated too shallow.

"It is planned to test different modifications of these implements and procedures during the field trial work next summer. Most of the farmers on whose places the trials were conducted last year were interested in carrying on the work another year."

Land Resting Studies - O. R. Neal, Marlboro, New Jersey.-"The land resting studies at the Marlboro station were initiated in the fall of 1945 and all areas except the check plots were in the resting and soil improvement crops during 1946. Information on the effect of the treatments on physical soil properties and on yield of cultivated crops will be available during the coming year.

"Studies of the effect of organic matter additions and land resting treatments on the yield of subsequent cultivated crops have been underway to a greater or less extent on privately-owned farms during the past five years. So-called resting crops have been clover and timothy mixtures, timothy and orchard grass, wheat and vetch, ryegrass and vetch, crimson clover, and others. Following the growth and plowing under of these crops yield increases, as compared with adjoining continuously cultivated areas, have occurred in practically all cases with crops of tomatoes, sweet corn, potatoes, peas, beets, rutabagas, sweet potatoes, lima beans, lettuce, and field corn. The land resting operation is known, from other investigations, to be effective in reducing soil and water losses. Data from these field trials indicate that the operation is also effective in increasing yields of a wide variety of crops."

Results of the 1946 Field Trials in South Dakota - Ralph A. Cline, Brookings, South Dakota.-

Contour Farming in Relation to Yield - "Contour farming in selected fields has increased crop yields over comparable fields where ordinary up and down hill method of farming were used in all parts of the state except in the northcentral area; row crops grown on the contour have increased an average of 17.0 percent; small grains have shown an average increase of 15.0 percent.

Subsurface Tillage in Relation to Crop Yield - "Increased crop yields have resulted from the use of subsurface tillage in the drier parts of the state where small grains are combined; in the more humid portions of the state some difficulty has been experienced with weeds but crop yields are about equal to those from conventional types of tillage.

Crested Wheatgrass Aids in Control of Bindweed - "Crested wheatgrass has been able to establish itself in old stands of field bindweed (*Convolvulus arvensis*); in areas of low rainfall crested wheatgrass has satisfactorily controlled bindweed where dense stands of grass are secured; in areas of higher rainfall crested wheatgrass has greatly reduced the stand and vigor of bindweed but has not been as effective as in drier areas."

Effect of Cover Crops on Grape Yields - S. E. Collison, Hammondsport, New York.-"In an experiment with grape cover crops 1938-46 at Hammondsport, New York, a solid cover of ladino clover the fourth year after seeding depressed yields some 15 percent. All rows were approximately on the contour, and cultivated plots were used as checks. Canada bluegrass, as a solid cover in the same time depressed yields 30 percent. In both cases the depression was small the first three years. The spring of 1946 all plots were plowed and cultivated to determine the residual effects. The yield of the ladino plots was 20 percent above the checks, and the bluegrass 15 percent."

Wide Rows Produce More Potato Tops and Less Tubers - J. S. Andrews. "In the potato study reported in last month's paper, a record was kept of the dry weight of the potato plants. A summary of the data indicates a correlation between row distance and size of tops. The wide spacing (36 inches) consistently produced the most tops but the lowest yield of tubers.

	12-inch rows	18-inch rows	36-inch rows
Tops, pounds dry matter per acre	1168	1130	1500
Average yield tubers, bushels per acre	454	457	374

A Suggested Method of Maintaining Earthworms on Cropped Land - Henry Hopp, Beltsville, Maryland.-"Earthworms have various beneficial effects on soil, particularly its physical structure. However, this information has been of little practical importance to farmers because no methods are known whereby earthworms can be built up when land is cropped. In a recent publication (*Jour. Soil and Water Cons.* 1 (2), October 1946) we showed that continuous cropping will destroy the earthworms. We have now found the apparent cause and a means of correcting the effect. Monthly counts this past year in a 2-year rotation gave the results shown in the table on the following page.

"On the cropped land, the reduction of earthworms occurred in the late fall when the first cold spell froze the soil quickly. The heavy freeze caught the earthworms in the upper soil zone before they had time to channel down to a lower depth. On clean-tilled land, this was preventable by protecting the soil in advance of the freeze, as shown in the second table on the following page.



Table 1

Season	Earthworms (Thousands per acre)	
	Sod in spring, corn in summer, small grain in fall	Small grain in spring, Sod in summer and fall
Early spring	290	70
Late spring	320	80
Summer	380	210
Early fall (before first heavy freeze)	480	340
Late fall (after first heavy freeze)	80	350
Winter	60	330

Table 2

Plot and 1946 Crop	Type of Surface Protection	Earthworms (thousands per acre)
C-15 Corn	None	0
	Burlap	995
D-8 Corn	None	0
	Lespedeza mulch	1,610
B-14 Soybeans	Light residue	335
	Heavy residue	665

"Possible practical measures to provide surface covering in the late fall, so that the earthworms have time to burrow down with the first freeze are:

1. Spreading manure, straw from thrashing, or other residues on the soil surface in the fall. This method may be practical for dairy and intensive vegetable farms.
2. Seeding quick-growing covers at the last cultivation of the summer crop. This method is applicable to more general types of farming.

"It is suggested that this principle be tried at stations where maintenance of soil structure is an important factor in continuous cultivation. The objective should be to get a protective cover on the ground before the first heavy freeze."



# DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio. - "This month was noted for its many days of precipitation. On 20 days of the 31, some precipitation fell. The total was 4.84 inches - about 50 percent above normal. On 13 days rainfall was recorded. Surface runoff from the small poor-practice wheat watershed occurred on 18 days, and that on the conservation-wheat watershed, 7 days. The total runoff for the month on the former amounted to 0.42 inch and on the latter 0.45.

Vegetal cover had little or no effect on the total surface runoff. Soil drainage, obviously, was a large factor. Watershed No. 115 which has a poor meadow cover had only 0.37 inch runoff, whereas, No. 123 (good meadow) had 0.85 inch runoff. The soil in the latter watershed was poorer in drainage than the former. A watershed (No. 109) having a good meadow and a well drained profile had only 0.01 inch of surface runoff.

"Furthermore, the runoff on larger watersheds having seeps was greater than those areas having no seeps. Runoff from wheat watershed No. 110 (no seeps) amounted to 0.42 inch and that from No. 192 (a few seeps) totaled 1.08 inches. With the soil profile well filled with water, there was almost as much water percolating to the ground-water tables as taken up by the surface soil. Infiltration at the soil surface totaled a little over 4 inches. Lysimeter percolation at the 8-foot depth amounted to about 3 inches. The maximum rate of runoff per unit of area resulted from the small 2-acre wheat watersheds. This was about 50 percent greater than that from the 8-acre wheat watershed.

"Aggregate analysis of soils on three conservation practice watersheds was completed this month. Coefficient of aggregation for six depth intervals is given in the following table. Samples were taken in October 1946. Wheat on the cultivated watersheds had been harvested in July 1946."

Table 1.--Coefficient of aggregation in various soil layers

Soil depth (inches)	Muskingum silt loam : Watershed 104 : permanent pasture	Muskingum silt loam : Watershed 109 : 4 Yr. rotation CWM	Keene silt loam : Watershed 123 : 4 Yr. rotation CWM
(topsoil)			
0-1	750	347	356
1-3	663	334	351
3-5	438	367	382
5-7	414	367	357
(subsoil)			
7-10	338	286	274
10-14	313	267	254

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.-"January precipitation was slightly above 'normal'. A rainfall of 1.54 inches on January 29-30 produced substantial runoff from prevailing treated watersheds which were fallow following corn in 1946 and these seeded to wheat (with bean straw disked in). There was little or no runoff from the corresponding conservation treated watersheds.

"Analyses are being made of 5 years' records of annual and crop-period runoff according to cropping and treatment. The average reduction of runoff during the corn growing season by the conservation treatment has been about 7 percent of the rainfall during the crop-period, ranging between 0.2 percent and 15.4 percent.

"The variation from year to year was such as to render it impossible to conclude from the limited runoff data yet available that there will be any saving on a longtime basis. However, it appears that there is a positive correlation between the saving effected and the total rainfall during the particular cropping season, which may be approximately expressed by the equation:

$$R = 1.34 P - 19.83, \text{ when}$$

R = Reduction in corn season runoff by conservation treatment in percent of total season's rainfall.

P = Crop season rainfall in inches.

"This indicates that no saving may be expected when the crop season rainfall is less than about 15 inches. It also permits use of available rainfall data for longer periods to extend our limited runoff data. If we substitute the 'normal' rainfall for the corn growing period, for P in the above equation, we obtain a value of R of approximately 1 inch. This would appear to be a logical estimate of the average saving in runoff which we may expect from the present conservation treatment of our experiment watersheds over a long period.

"If practically all runoff saving during the growing season becomes available to the corn crop, the moisture saving might be expected to make possible an average annual increase in yield of around 5 bushels per acre. Longer records and extended studies of moisture utilization are needed to verify such an estimate.

Table 1.--1946 Corn Yields, Crop Residue Management and Mulch Tillage Experiments, Purdue-Throckmorton Farm, Lafayette, Ind.

Average Yields<sup>1/</sup>, Bushels Per Acre

Fertilizer :		Tillage treatments <sup>2/</sup>								
treatment <sup>3/</sup>		1	2	3	4	5	6	7	8	9 : Mean, 2-8 only
Low	-	49.8	48.3	59.6	66.1	51.9	65.8	66.2	79.2	58.2
High	-	59.7	57.5	64.2	66.5	67.0	77.0	72.3	82.1	66.3
Mean (L&H)	-	54.76	52.9	61.9	66.3	59.45	71.4	69.25	80.65	62.3

<sup>1/</sup>Yield corrected to 17-1/2 percent moisture content of grain.

<sup>2/</sup>1. No tillage prior to planting.

2. Surface mulch, 2-3 inch depth of tillage.

3. " " , 6-7 " " " "

4. Residue mixed, 2-3 inch depth, 2-3 inch depth of tillage.

5. " " " " , 6-7 " " " "

6. " " , 6-7 " " , " " " "

7. " turned under, 6-7 inches deep, 6-7 inch depth of tillage.

8. " " , 4-5 " " , 4-5 " " " "

9. " " , 6-7 " " , 10 " " " "

<sup>3/</sup>Low = 125 lbs. 0-14-7, 3 inches beneath seed.

High = 500 lbs. 8-8-8, " " " "

Note: L.S.D.<sub>.05</sub>: (Tillage Treatments, Nos. 2-8 only)

Tillages = 10.0 bushels per acre.

Fertilization = 3.2 bushels per acre.

Interactions, Fertility x Tillage = 8.1 bushels per acre.

"Tillages 1-8 comprised the basic experiment; No. 9 (sub-soil plowing) was added in 1946 and so located that it cannot be validly compared with all others. Compared with treatment No. 7 only (conventional, 7 inch depth plowing) the difference in favor of the No. 9 treatment was not significant at the 95 percent level, with either high or low fertilization, although it approached significance at that level with the lower rate of fertilization.

"Compared with all others, No. 7 treatment yielded significantly higher than surface mulch with either shallow or deep tillage at both levels of fertilization; but not significantly higher than any of the mixed residue treatments, irrespective of tillage depth. There was no significant interaction between tillage and fertilizations as indicated by the previous years' results."



The following statement was inadvertently omitted from our last Monthly Summary Report. It should appear after table 1 for Cromwell, Ind.

Note: L.S.D.<sub>05</sub> are:

Tillage = 10.4 bushels per acre.

Fertilization = 0.8 bushels per acre.

Interaction, Fertilization x Tillage = 2.1 bushels per acre.

"There were no significant effects of tillage treatment on the yields. However, the effects of differences in fertilization rates were significant, and also interactions between fertilization and certain of the tillages. It should be particularly noted that significant negative effects of the higher rate of fertilization appeared this season for two depths of plowing and for the deeptilled, surface mulch plots."

Hydrologic Studies - R. G. White, East Lansing, Michigan.-

"There were nine periods of runoff during the month at the cultivated watersheds, with runoff occurring on 16 of the 31 days. Runoff and soil-loss calculations for the month are not completed as yet, but approximately 1.5 inches of water was lost as runoff. There was no soil loss at watershed 'B' (brome-alfalfa sod), and soil loss at watershed 'A' (rye winter cover) was quite light. Due to the fact that temperatures did not climb far above the freezing point, there was practically no thawing of the soil until after all snow had disappeared and runoff ceased. This resulted in exceptionally light erosion losses during the month."

Hydrologic Studies - R. W. Baird, Waco, Texas.-

"The item of primary interest for the month has been the weather. A freezing rain starting the afternoon of January 1 ushered in the coldest week of weather since 1941. There was a total precipitation January 1 and 2 of 0.68 inch, most of which fell as rain but froze on the ground as it fell. Much of this ice melted during the afternoons of January 2nd and 3rd but the lowest temperature (9°F) since 1941 occurred during the early morning of January 4th. There were below freezing temperatures on each of the first 6 days of the month and again the 16th, 21st, and 22d.

"The cold wet weather severely damaged winter cover crops and the winter legumes in pastures. The extent of the damage is still difficult to determine. Approximately 50-75 percent of the fall planted oats are killed. Oats planted for grain must be either replanted or have other crops substituted. All oats on the Government operated land will be replanted if possible. This work was started Jan. 31. On some other fields replanting of oats may not be early enough to have reasonable probability of making a crop. Cotton, corn, sorghums, or spring planted Huban Clover are reasonable substitute crops. Austrian winter peas intended for plowing under as green manure prior to cotton planting were frozen to the ground but many were again making a considerable growth at the end of the month. Most fall seeded Huban Clover is recovering from the freeze but it also was severely damaged. In the pasture areas Burr Clover appears to be recovering satisfactorily but the amount of early spring grazing will be seriously reduced.



"Rainfall for the month totaled 3.86 inches, about twice the normal amount. There was 2.25 inches of rain January 16 and 17. This was a slow rain with continuous rain for 30 hours but the maximum in any one hour was 0.21 inch. This rain caused considerable runoff at low rates."

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"An inspection of the wheat fields indicate that very little wheat has been winter killed, the plants are well stooled and are in excellent condition for this time of year."

"A three-way comparison of the peak runoff from corn, oats, and wheat for the major storms of this year and also of the highest peak for each year since 1943 shows that subtilled corn has had the lowest peak every year and for the six major storms for this year has had a lower peak on four of the storms with contour corn having a slightly lower peak on two of the storms. There is very little difference between the contour corn and the subtilled corn but both show considerably lower peaks than the corn in straight rows."

"In 3 of the 4 years subtilled oats has had the lowest peak with contoured oats having the lowest peak in 1943. For the major storms of this year subtilled oats had had the lowest peak 67 percent of the time with contour and straight row each having one low peak. The peaks were very low for the storm when the straight row oats had the lowest peak."

"The subtilled wheat has had the lowest peak of the 4 years. In 1944 the peaks were all nearly the same with straight row wheat slightly lower than contoured and subtilled. For the peaks in 1946 the subtilled wheat had considerable lower peaks on three storms, and on the other three storms the peaks were slightly lower on straight row and subtilled wheat than the peaks on the contoured wheat."

"The results show for all the crops that sub tillage had had the lowest peak for 10 of the 12 peaks, with contouring and straight row each with one peak. The peak when straight row had the lowest was very nearly equal for all the practices."

Runoff Studies - N. E. Minshall, Madison, Wisconsin.-"Precipitation at Edwardsville for the month was 1.76 inches as compared with the normal of 2.40 inches. There were no high intensities but a total of 0.92 inch of rainfall on the 29th caused runoff of 0.56 inch. The total runoff for the month from the 50-acre pastured area was 1.33 inches. Temperatures during the month were generally above normal with a maximum of 60 degrees being recorded on the 24th."

"Precipitation at Fennimore for the month was 1.61 inches, most of which was in the form of snow. Of this amount, 1.1 inches came in a 24-hour snow storm accompanied by high winds and heavy drifting on January 29 and 30. During this storm, rainfall station R-6, which is used as the

key gage for these watersheds was completely covered with drifting snow. From a comparison of the record of R-6 with that of the weekly rainfall station, the record appears to be reasonably accurate for the main part of the storm. The weekly station designated as R-1 shows a catch of 1.55 inches in the Standard and 0.65 inch in the recorder, yet they are only 6 feet apart. A Standard gage at this station is equipped with a home-made windshield. The differences experienced at this station as well as the fact that station R-6 was completely covered with a drift indicates the necessity of elevating one of the gages and equipping the same with a windshield."

Runoff Studies - T. W. Edminster, Blacksburg, Virginia.-"During the week of January 13 the Project Supervisor together with the members of the Experiment Station staff attended the annual meeting of the Southeast Section of the American Society of Agricultural Engineers in conjunction with the American Society of Agricultural Workers in Biloxi, Mississippi. On the 14th, the Project Supervisor presented a paper entitled 'The Farm Pond - A Conservation Tool'."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.-"Mr. Anderson has completed his tests of the 2-1/4 inch model of the drop inlet spillway with a pipe length of 20 diameters. Two series of tests were made with the pipe slope set at 10 and 20 percent. Sixteen test runs were made for each slope setting.

"Variation of the riser loss coefficients is presented below together with minimum values of the  $H/D$  and  $Q/D^{5/2}$  ratios necessary to insure that the pipe flows full. Here  $H$  is the head over the inlet,  $D$  the pipe diameter, and  $Q$  the discharge. These values are valid only for a pipe  $20D$  long.  $K_R$  is the coefficient in the equation  $K_R V_p^2/2g$  where  $V_p$  is the velocity head in the pipe.  $K_R$  includes the losses at the entrance to the riser and at the junction of the riser and pipe.

Pipe slope	$K_R$	$H/D$	$Q/D^{5/2}$
Percent			
2-1/2	0.90	0.75	9.5
5	0.92	0.80	10
10	0.82	0.85	11
20	0.75	0.95	13
30	0.75	1.00	15

"Plans for a 2-1/4 inch lucite model with a pipe length of 100 diameters were practically completed this month. A few days were spent in preparation of graphs and figures of the 2-1/4 inch drop inlet spillway model tests to be included in the annual report.

"Mr. Donnelly continued his tests of submergence on the box inlet drop spillway. These tests are still in the exploratory stage. In the present tests we are using the same quantity of water and the same box dimensions for each test, but varying the flare of the outlet sidewalls. It was found that when the outlet has straight (parallel) sidewalls, there is about 10 percent more submergence than when the basin walls are flared at 1:5. Tests are now being made to determine how much flare is necessary if submergence of the spillway is to be prevented."

Hydraulic Studies - W. O. Ree, Stillwater, Oklahoma.-"During the month a paper was prepared for presentation before the Second Annual Oklahoma Crops and Soils Conference. The paper is entitled 'Relative Protection Offered by Two Different Grasses to Conservation Channels in Soils of Different Texture'. The different soil textures used in the experiment described were a silt loam, a sandy loam and a fine sand. The grasses were Bermuda grass and weeping lovegrass. The following table lists the combinations tested:

Table 1.--Channels tested

Soil	Bermuda grass	Weeping lovegrass
Silt loam	U2-1	U5-1, U6-1
Sandy loam	U2-4	U7-2
Fine Sand	U3-7	-

Each of these channels had the following dimensions:

Shape- rectangular      Slope- 5 percent  
 Bottom width- 3 feet      Length- 96 feet  
 Sides- Vertical plywood panels in place only  
          during flows.

"The important results of the experiment are presented in the following table:

Table 2.--Results of the experiment

Channel Number	Cover	Soil texture	Test flow during which permissible velocity was judged to have been exceeded	Flow Discharge rate	Mean velocity
			No.	c. f. s.	feet per sec.
U2-1	Bermuda grass	Silt loam	15	35.7	9.5
U2-4	Bermuda grass	Sandy loam	13	11.0	5.9
U3-7	Bermuda grass	Fine sand	11	4.3	3.5
U5-1	Weeping lovegrass	Silt loam	13	14.1	4.6
U6-1	weeping lovegrass	Silt loam	13	14.0	4.7
U7-2	Weeping lovegrass	Sandy loam	12	6.8	2.7



"Tentative recommended permissible velocities were offered for a good uniform cover in a uniform channel. These are given in the following table:"

Table 3.--Recommended permissible velocities

Grass	Soil texture	Permissible velocity ft/sec.	Maximum slope ft/ft.
Bermuda	Silt loam	8.0	10
"	Sandy loam	5.0	10
"	Fine sand	3.0	5
Weeping lovegrass	Silt loam	3.5	5
" "	Sandy loam	2.0	5

Sedimentation Studies - L. C. Gottschalk, Washington, D. C.--"An analysis of hydrologic data was completed and a report prepared on the effects of floods and flood control on the bank-protective measures installed on the Winooski River, Vermont, in 1935 as part of the Winooski Demonstration Project. As a result of this study it was concluded that regulated releases from the existing headwater flood-control reservoirs have had no appreciable effect on bank erosion on the lower sections of the stream. Many local people have thought that the reservoirs might seriously increase bank erosion by prolonging flows above the normal base flow of the stream. The results of this analysis showed that the bank-protective measures and chute barricades constructed on this stream in 1935 have withstood the erosive force of a flood having a recurrence interval of about once in 20 years."

Sediment Studies - Vito A. Vanoni, Cooperative Laboratory, California Institute of Technology, Pasadena, California.--"During the week of January 6, Dr. H. A. Einstein attended a conference at Albuquerque, which was held to discuss the hydraulics problems of the development of the Middle Rio Grande Valley. At this conference there was outlined a program of field measurements, including the collection of sediment samples. These data will be made available to the Laboratory for use in checking the analytical expressions for sediment transportation developed at the Laboratory. If these formulas can be shown to apply to the Rio Grande as it now stands, then they can also be used to predict the behavior of the stream after the proposed dams are constructed. If these formulas apply in this case, they can also be used generally in many other developments on streams of all sizes."

"The dye columns injected into the Eaton Wash near Encinita Avenue were excavated to determine the amount of scour for the December storms. There was practically no scour at this point for these flows which had a maximum stage of about 2 feet."



Sediment Studies - V. J. Palmer, Ithaca, New York.-"This period was devoted to library investigation of references pertaining specifically to impermeable spur dikes, as used in river regulation and stream-bank control. Material important to the engineer having the problem of designing spur dikes was extracted for the project's files, and a manuscript entitled, 'Notes on Impermeable Spur Dikes' is being prepared. The objective is to gather together in a single publication, information that is now obtainable only in scattered references so as to be immediately available to the technician confronted with a bank stabilization problem. It is hoped that other manuscripts of this type may be prepared containing notes on (1) permeable spur dikes, (2) vegetal protection, (3) revetments, (4) barriers and check dams, (5) training walls, and other related subjects so that the benefit of past experience will be readily accessible to the technician.

"The problem of stream control and bank stabilization is very complicated and it is difficult to establish more than general design specifications. Experience and judgment of the technician is of great importance. The series of 'Notes' being planned will guide and assist the technician who is relatively inexperienced in this work. They will provide a good foundation on which to expand and develop the research program of this project."

Drainage Studies - C. Kay Davis, The Everglades Project, Fort Lauderdale, Florida.-"The water table in the Everglades generally is higher at this time of the year than last year. The freeze, however, will encourage uncontrolled fires. The main canal of this line project was deepened (rock excavated) so as to get a plentiful supply of water to the west limits. In case of fire approaching this project, preparations are being made to raise the water table to the surface of the lands as quickly as possible. About 2 feet of rock was excavated from the east and west main canal to increase the capacity of this canal. The pumps should now have a plentiful supply to raise the water level and maintain a level that will prevent soil burning. Many of the farmers in the Belle Glade area are becoming conscious of the loss of soil elevation. The blue area which occurs on our soil maps (Sheet No. 14) just immediately south of Belle Glade has brought many of the farmers in this area to a realization that they are losing their farms very rapidly. The work we are encouraging on this line project may lead the way toward a higher water table for prevention of soil burning when conditions are so favorable for uncontrolled fires (after frost)."

Drainage Studies - M. H. Gallatin, Homestead, Florida.-"Moisture readings on the mulch plots are all somewhat higher for this period when the rainfall is low. The natural cover plot was lower in moisture than any of the rest. Indications are that with a heavy growth of material there is little conservation of moisture. The grass and pine straw mulching is still superior to shavings.

"General moisture readings for this area were quite low and in many instances indicated that irrigation should be started. Most of the growers were still trying to hold their trees dormant during this period so as to minimize danger from low temperatures.

"There has been a slight increase in the chloride content for the Miami area. On the average the concentration went up from 100 - 200 p.p.m. Indications at present are that they will remain relatively low especially in the area where temporary control structures have been placed. Sampling of the Goulds and Military Canal areas in the Homestead area show that the chloride content has not increased very much this year. Some of the lower areas that were affected by the high tides of a month or more ago are still quite high."

Drainage Studies - James Turnbull, Lake Alfred, Florida.-"During January the drought continued with only 0.32 inch of rainfall. It was necessary to start the second irrigation of the season on January 6 and irrigation of the experimental plots was completed on January 14.

"Work has been continued on measuring the discharge from drilled irrigation pipe. Measurements have been made of the discharge from drilled pipe having 1/16 inch, 5/64 inch, and 3/32 inch holes at pressures ranging from 5 to 50 pounds per square inch. Continued pumping from the lake for irrigation has dropped the lake level to a point where it is now lower than the elevation of the water table in all of the water-table wells. This is the first time since early October that the water table in all wells has had a higher elevation than the lake."

# IRRIGATION DIVISION

Consumptive Use of Water.-Harry F. Blaney, Los Angeles, California, has reported some estimates of the consumptive use of water in San Pasqual Valley, California. "Based on previous research studies an estimate was made by the integration method...as follows:"

Classification	Area	Consumptive use of water	
		Unit	Total
	Acres	Ac. ft. per acre	Acre-feet
<u>Irrigated lands</u>			
Alfalfa and sudan	295.6	3.4	1,005
Field crops	115.4	1.5	173
Orchards	44.3	2.4	106
<u>Native Vegetation</u>			
Salt grass	1,246.3	2.7	3,365
Trees and brush	904.2	3.7	3,346
Swamp	13.4	4.9	66
<u>Miscellaneous</u>			
Farm lots	35.1	2.0	70
Fallow	63.7	1.4	89
Other	228.4	2.0	577
Total	2,946.4	----	8,797

Water Law.-Wells A. Hutchins, Berkeley, California, reports the preparation of a report on Principles of State Water Legislation:

"Work on this project consisted of the completion of an index and minor revisions preparatory to submission of the final report to the National Reclamation Association for mimeographing.

"This report has been described in previous monthly reports. Briefly, it is the final report of a committee of the National Reclamation Association, of which I have been chairman, appointed pursuant to a resolution of the Association adopted at the 1942 convention. The committee brought in a preliminary or progress report in time for the 1943 convention, and invited comments. The project was then temporarily discontinued, owing to the press of other matters, and was resumed in 1946. The committee prepared a final report which embodies what it considers to be desirable principles of State water legislation based upon the doctrine of prior appropriation. At the 1946 convention at Omaha, I made an address describing the work of the committee and the report then being presented to the Association. Subsequently I have prepared a complete index and made some



minor revisions. The committee members have approved the release of the report. It was transmitted on January 17 to Don McBride, Secretary-Manager of the Association, who has undertaken to have it mimeographed for distribution to interested parties."

Infiltration Tests in Oregon.-Albert W. Marsh, Corvallis, Oregon, writes regarding an experiment showing infiltration due to structural changes in soil:

"Slick spot soils in greenhouse pots which have incubated for 2 years with various chemical treatments and ground alfalfa have been tested for structural changes by percolation trials as previously reported. These soils have now been seeded to alta fescue to check their productivity following the various treatments and to evaluate the effect of a close growing sod on the infiltration capacity and further reclamation of these soils. The alfalfa series and the horizon mixtures were provided an NPK treatment and the alfalfa series had ground alfalfa equivalent to 2 tons per acre mixed into the surface inch of soil. It was thought this would simulate a cover crop disked into the surface. The chemical series received no additional treatments.

"Four days after seeding and initial wetting fine barely visible mycella covered the surface of the alfalfa treated soils. When additional water was added from a beaker it first rolled as though on a waxed surface, but was soon readily absorbed. In these jars not a granule of soil was eroded or dispersed by the watering while in the chemical series even with the greatest care soil eroded from under the falling stream of water and much of the soil surface in the jar had a dispersed appearance by the time the watering was completed. Critical slope and velocity factors would probably have little meaning under comparative conditions such as these."

Colorado River Water Forecasting Committee.-R. L. Parshall, Fort Collins, Colorado, reports on preliminary work of forecasting water supply on Colorado River:

"I have prepared the first draft of the report covering the April 16, 1946 meeting of the Colorado River Water Forecast Committee held at Los Angeles. The notes prepared covering this meeting were pretty sketchy, however, sufficient in detail to follow the trend of the day's discussion. In order to round out the manuscript as a whole it was necessary to elaborate somewhat upon the notes submitted, in order to have continuity and order of the things presented at the meeting.

"Further attention has been given to the matter of working out the runoff in the Colorado River, as based upon the relations between Fall and Summer flow. It is found the same as on other streams studied that it appears to be possible, early in January, to forecast the runoff within a

deviation of 25 percent for 4 out of 5 years. This same relation appears to exist for the Colorado River at Glenwood Springs, the Animas River at Durango, and also the Arkansas River at Salida."

Rates of Runoff.-Hayden K. Rouse, Colorado Springs, Colorado, reports some data in connection with project entitled, "Rates of Runoff for the Design of Conservation Structures in the High Plains of Colorado and New Mexico":

"An analysis has been made of the runoff data for the 1946 season at the Colorado Springs, Colorado project. On watershed W-I peak rates were recorded which rank 12, 19 and 22 among the 44 important peaks occurring during the 9-year period of record. On Watershed W-II, the 1946 peaks rank 3, 6, and 14 among 34; on Watershed W-III, only one important peak occurred which ranks 15 among 36, and at W-IV, the 1946 peaks rank 4, 20, 26, and 34 among 38 occurrences.

"New frequency studies were made based on the 9-year period of record and compared with the results of studies made based on an 8-year record, using identical methods for analysis. As might be expected from the ranking of the data for the ninth year, the new frequency studies yielded results for Watersheds W-I and W-III which are almost identical with those based on 8 years. The new data from Watersheds W-II and W-IV, however, provided new points tending to establish frequency curves with a more definite trend which may permit reductions in recommended peak rates, having 25-year frequencies by as much as 20 percent. As a result of these studies, revised values have been submitted for incorporation in a manuscript tentatively entitled 'Rates of Runoff for the Design of Conservation Structures in the High Plains of Colorado and New Mexico', which had previously been submitted to Washington for review."

Erosion Losses in Irrigation.-Stephen J. Mech, Prosser, Washington, reports some findings in a preliminary statement on erosion losses on irrigated land:

"The following erosion losses and rates of flow at which these losses occurred indicate the influence of crop and crop sequence on soil erodibility. It shows, for example, that on the 2 percent furrow grade at flows approximately 0.5 cubic feet per minute per furrow the soil losses were 31.4, 11.1 and 2.0 tons per acre for potatoes, first year alfalfa and 2nd full cutting alfalfa respectively. This means that this soil was building up a resistance to a stream of this magnitude. A similar increased resistance but in a much lesser degree is indicated for the 7 percent slope.

Row Crop		1946 Alfalfa			
1945 Potatoes		1st cutting year		2nd cutting year	
Runoff	Erosion	Runoff	Erosion	Runoff	Erosion
<u>In/hr</u>	<u>Tons/Acre</u>	<u>In/hr.</u>	<u>Tons/Acre</u>	<u>In/hr</u>	<u>Tons/Acre</u>
2% Furrow grade					
0.10	2.5	0.15	0.7	0.13	0.2
.45	31.4	.50	11.1	.51	2.0
.78	45.6	.86	23.9	.86	4.3
7% Furrow grade					
0.11	9.8	0.13	9.4	0.13	2.2
.35	33.2	.39	33.1	.43	14.2
.58	63.4	.66	41.6	.73	26.7

"The above data are only a measure of soil erodibility and not a direct measure of the erosion under the three crops because of the wide variation in the minimum flows required to irrigate a given length of run under the three crops listed."

Drainage in Utah.-J. Howard Maughan, Logan, Utah, reports that study of Utah Drainage Districts reveals that most of the 38 organized districts were set up soon after world War I. The high prices for agricultural product and demand for farm land are also stimulating renewed interest in drainage following World War II. Purpose of the Utah study is to learn the accomplishments, problems and needs of Utah districts in the drainage of agricultural land. This cooperative study being conducted with Utah Agricultural Experiment Station has been in progress for about a year and is expected to be finished near the end of 1947.

3/4/47

